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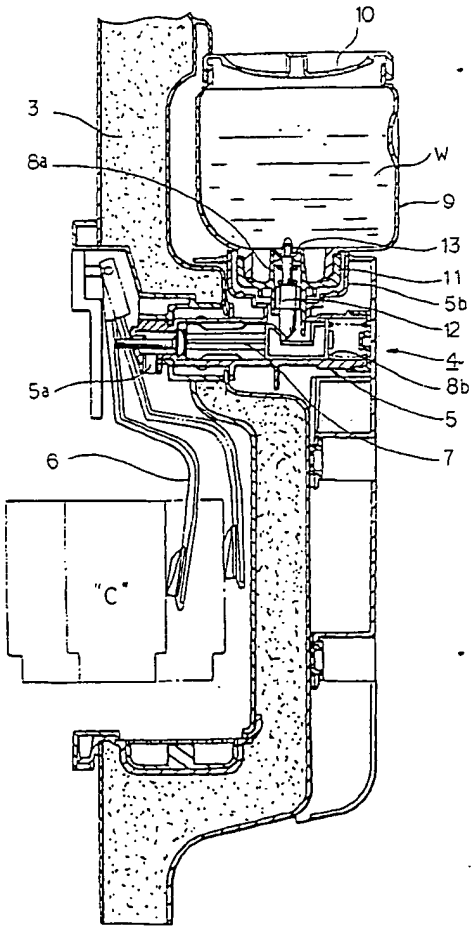
(54) Refrigerator with improved beverage dispenser

(57) A refrigerator 20 includes an improved beverage dispenser that includes a container 40 for the beverage, disposed within the cooling chamber 21 of the refrigerator, and a dispensing valve 30 with an orifice 31a accessible from outside the refrigerator, which extends through an opening 24 in the door. The beverage is dispensed by operating a lever 52 which moves a slidable valve member 35 against the force of spring 38, by means of the repulsive force between permanent magnets 51, 34. A seal 60 is provided by members 61, 62, 63 around the valve 30, where it extends through the hole 24.

FIG. 2



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Description

This invention relates to a refrigerator with a beverage dispenser, which allows a chilled beverage to be dispensed from the outside of the refrigerator.

A prior art refrigerator with a beverage dispenser is shown in Figure 1, which includes a main body 1, with doors 2 and 3 that provide access to freezing and refrigerating compartments. The door 3 is provided with a beverage dispenser 4, which is commonly used to provide a supply of chilled water.

Referring to Figure 2, the door 3 of the refrigerator, which provides access to its refrigerating compartment or cooling chamber, is shown in cross section. Chilled water W is dispensed through a cylindrical valve 5, from an outlet orifice 5a, under the control of a lever 6 which actuates the valve when a cup C or like receptacle for the beverage, is pressed against it. The lever 6 actuates a slidable valve member 7 within the valve 5 against the force of a spring 8b.

The chilled water W is held in a container 9 with an upper screw cap 10 and a lower screw fitted cap 11 that contains a slidable valve body 12, which is pressed downwardly by a spring 8a in order to maintain a valve head 13 closed. When the lever 6 is actuated, the slidable valve member 7 lifts the valve member 12 so as to allow the chilled water to flow through the valve to the orifice 5a. Thus, water is discharged from the container 9 into the receptacle C.

The container 9 is thus mounted on the inside of the door, which results in a bulky and inconvenient arrangement. Furthermore, the dispenser is complicated to assemble due to the large number of component parts, and furthermore is inconvenient for cleaning purposes because the slide member of the valve 5 must be separated from the refrigerator body. Also, because the container 9 is mounted on the door, there is a limit to the quantity of water that can be stored for practical purposes, without making the door too bulky or cumbersome.

The present invention seeks to overcome these problems. In accordance with the invention, the container is mounted separate from the door, and the door includes an opening through which the orifice extends when the door is closed, for dispensing the beverage.

Thus, in accordance with the invention, the container can be mounted on the main body of the refrigerator, in the cooling chamber, to permit the volumetric capacity of the container to be increased, irrespective of the loading on the door.

Furthermore, because the orifice extends through an opening in the door, the valve construction can be substantially simplified, which facilitates cleaning, Means may be provided between the opening and the dispenser orifice, to provide a seal when the door is closed, so as to prevent cold air leaking from the refrigerator.

The container may be held on the main body, in the chamber, by means of a releasible lock which conveniently comprises a hinged detent which releasably grips the underside of the container.

In order to control flow of beverage through the orifice, a valve may be provided operable by a control device on the door, when it is closed. The control device may operate by means of a magnetic force to actuate the valve.

The valve may include a movable valve member that includes a first magnet, and the control device may include a movable second magnet which cooperates with the first magnet when the door is closed, in order to move the valve member.

In order that the invention may be more fully understood, an embodiment thereof will now be described by way of illustrative example with reference to the accompanying drawings in which:

Figure 1 is an elevational front view of a conventional refrigerator including a beverage dispenser;

Figure 2 is an enlarged cross sectional view of a portion of the door of the conventional refrigerator, showing the beverage dispenser in more detail;

Figure 3 is a schematic front elevational view of a refrigerator in accordance with the invention, with the door to its cooling chamber shown open;.

Figure 4 is a schematic partial cross sectional view of the door of the refrigerator, when closed, together with a portion of the beverage dispenser;

Figure 5 is a corresponding cross sectional view from above of the configuration shown in Figure 4; and

Figure 6 is a schematic exploded cross sectional view of the beverage dispenser, illustrating its valve, together with a portion of the door.

Referring to Figure 3, the refrigerator according to the invention is shown, with a cooling chamber or refrigerating compartment 21, accessible by means of a door 22 which is shown open. A container 40 for chilled water is shown in the upper left hand side of the cooling chamber 21, with a protruding valve 30 for dispensing the chilled water. When the door 22 of the refrigerator is closed onto the main body 1, the valve 30 together with its outlet orifice extends through an opening 24 in the door into a recess 23. As will be explained in more detail hereinafter, a receptacle such as a cup or glass can be inserted in to the recess 23, so as to open the valve 30 and fill the cup with chilled water.

Referring now to Figure 4, the water container 40 is of a generally rectangular configuration, typically made of plastics material. The container 40 is slidably received on a horizontally disposed support surface 75 that is built into the interior of the cooling chamber 21 in the main body 1. The support surface 75 is provided along its outer edge with a spring loaded detent 80 that is shown in more detail in insert A shown in hatched outline, in Figure 4. The spring loaded detent 80 is pivoted about a shaft 85 and biased by a spring 82 so that a

locating lug 84 can cooperate with flange 92 on the underside of the container 40 in order realisably to locate it in place. Thus, in use, the container 40 is locked in position within the cooling chamber 21, but can be released in order to refill it or for cleaning purposes, by operating the spring loaded detent 80.

Referring to Figures 4, 5 and 6, the valve 30 includes a valve casing 31 that is threadingly received on a flange 41 integrally formed around a water outlet opening in the container 40. The valve casing 31 has an outlet orifice 31a for dispensing chilled water. A valve member with a main body 35 is disposed within the casing 31. The valve member includes an elongate valve stem 36 coupled to the main body 35, which is slidably received between flanges 37 in the outlet opening of the container 40. A spring 38 is disposed on the stem 36 between the flanges 37 and the main body 35. A permanent magnet 34 is mounted in a recess in the main body 35 and is covered by a washer 33. The interior of the casing 31 provides a valve seat 32. The washer 33 on the valve member is biased against the seat 32 by the spring 38.

As shown in Figures 4 and 5, the valve 30 is opened and closed by means of a slidable, generally L-shaped control lever 52. Referring to Figure 5, a second permanent magnet 51 is mounted on the lever 52. The lever 52 is slidably mounted in a rail 53 and can be reciprocated back and forth against the force of a spring 54 mounted in a recess 55.

When it is desired to dispense chilled water, with the refrigerated door 22 closed, as shown in Figure 4, a cup or like receptacle (not shown) is inserted into the recess 23 and pushed against the lever 52 so as to drive it into the recess 55, against the force of spring 54. As a result, the entire lever slides inwardly along rail 53 so as to move the magnet 51 closer to the magnet 34 mounted in the valve member. The repulsive force between the first and second magnets 51, 54, causes the valve member main body 35 to be moved against the force of spring 38, so as to lift the washer 33 from the valve seat 31. As a result, water flows through the valve to the outlet orifice 31a and into the cup. When the cup is removed, the spring 54 drives the lever 52 outwardly, so that magnet 51 is moved away from the valve 30 thereby reducing the magnetic force produced between the magnets, so that spring 38 closes the valve 30.

Also, in accordance with the invention, sealing means 60 is provided in order to produce a seal between the valve 30 where it protrudes through the opening 24. The sealing means 60 includes a first annular, axially compressible sealing member 63 made of plastics material, which is received on the flange 41 of the container 40. The first sealing member cooperates with a second annular sealing member that includes an annular mounting member 61 received in a circular flange around the opening 24, which itself receives an annular lip member 62 which, when the door is closed, is pressed against the first sealing member 63 in order to provide an airtight seal that prevents cold air from leaking out of the refrigerator and warm air entering from outside. When the door 22 is opened, the first and second sealing members readily separate and do not impede door opening.

Many modifications and variations fall within the scope of the invention defined in the claims hereinafter. For example, whilst the dispenser may conveniently be used to dispense chilled water, other beverages could be stored in the container 40, for example orange juice. It will be seen that the construction of the beverage dispenser is much simplified as compared with the aforementioned prior art device. Furthermore, the capacity of the storage container 40 can be increased significantly. The container is securely held in place by means of the spring loaded detent 80 so that the act of opening the door will not dislodge it from its mounting, but it can readily be released for cleaning and refilling.

Claims

1. A refrigerator (20) including a cooling chamber (21), a door (22) to the chamber, and a beverage dispenser that includes a container (40) for the beverage within the chamber and a dispensing orifice (31a) accessible from outside the refrigerator for dispensing the beverage when the door is closed **characterised in that** the container (40) is mounted separate from the door, and the door includes an opening (24) through which the orifice extends when the door is closed, for dispensing the beverage.

2. A refrigerator according to claim 1 wherein the cooling chamber (21) is disposed in a main body on which the door is mounted, and the container (40) is mounted on the main body, in the chamber.

3. A refrigerator according to claim 2 including releasible locking means (80, 84, 92) that locates the container on the main body.

4. A refrigerator according to claim 3 wherein the releasible locking means comprises a hinged detent (80) for realisably gripping the underside of the container.

5. A refrigerator according to any preceding claim including means (60) for sealing the opening (24) when the door is closed.

6. A refrigerator according to claim 5 wherein the sealing means includes a first sealing member (63) on the container and a second sealing member (61, 62) on the door .

7. A refrigerator according to any preceding claim including a valve (30) for controlling flow of the bev-

erage through the orifice (31a), and a control device (52) on the door for opening the valve when the door is closed.

8. A refrigerator according to claim 7 wherein the control device (52) is operable to apply a magnetic force for actuating the valve.

9. A refrigerator according to claim 8 wherein the valve (30) includes a movable valve member that includes a first magnet (34), and the control device includes a movable second magnet (51) which cooperates with the first magnet when the door is closed for moving the valve member.

10. A refrigerator according to claim 9 wherein the valve includes a valve seat (32) and a spring (38) which biases the valve member against the seat, and the magnets cooperate for moving the valve member from the seat against the spring bias, to dispense the beverage.

11. A refrigerator according to any one of claims 7 to 10 wherein the control device comprises a lever (52) mounted on the door and operable by pushing a receptacle to receive the beverage against it such as to cause the beverage to pour from the orifice into the receptacle.

FIG.1

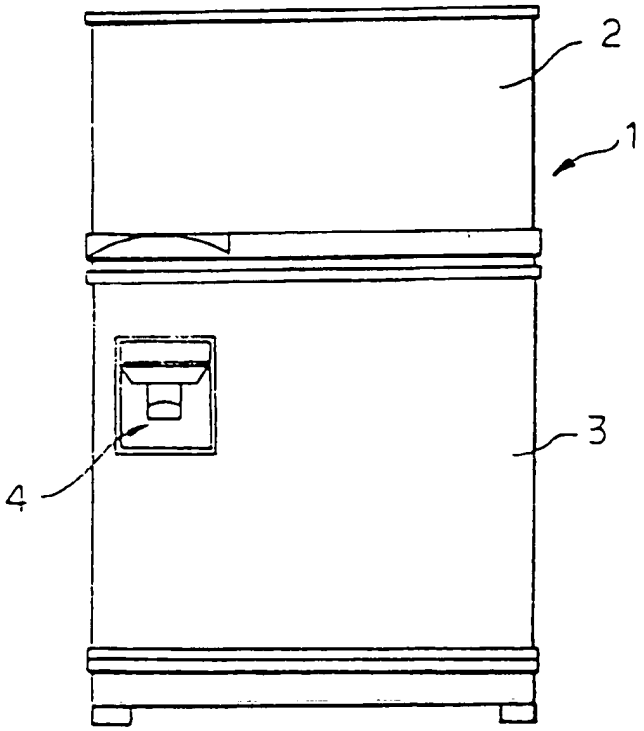


FIG.2

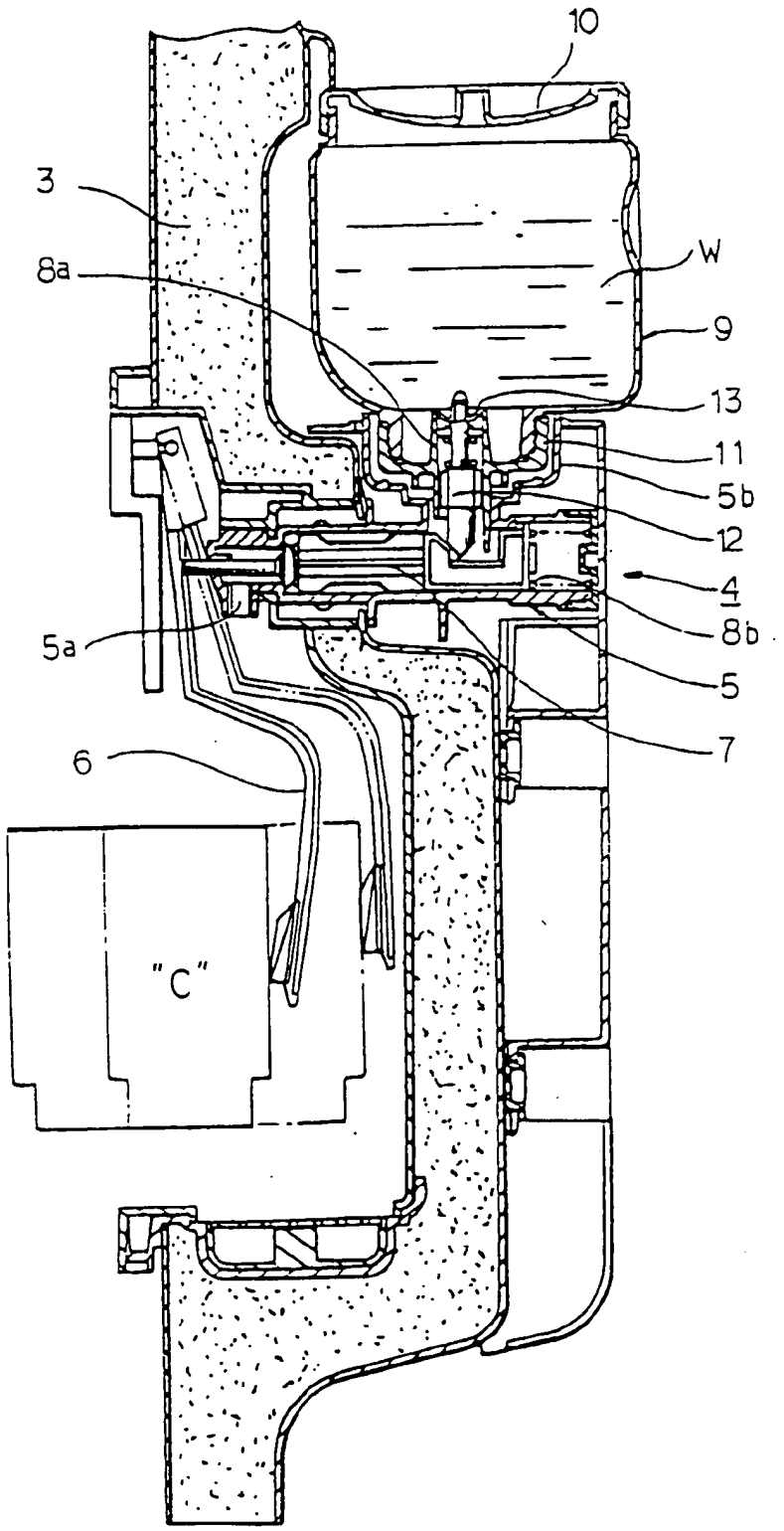


FIG.3

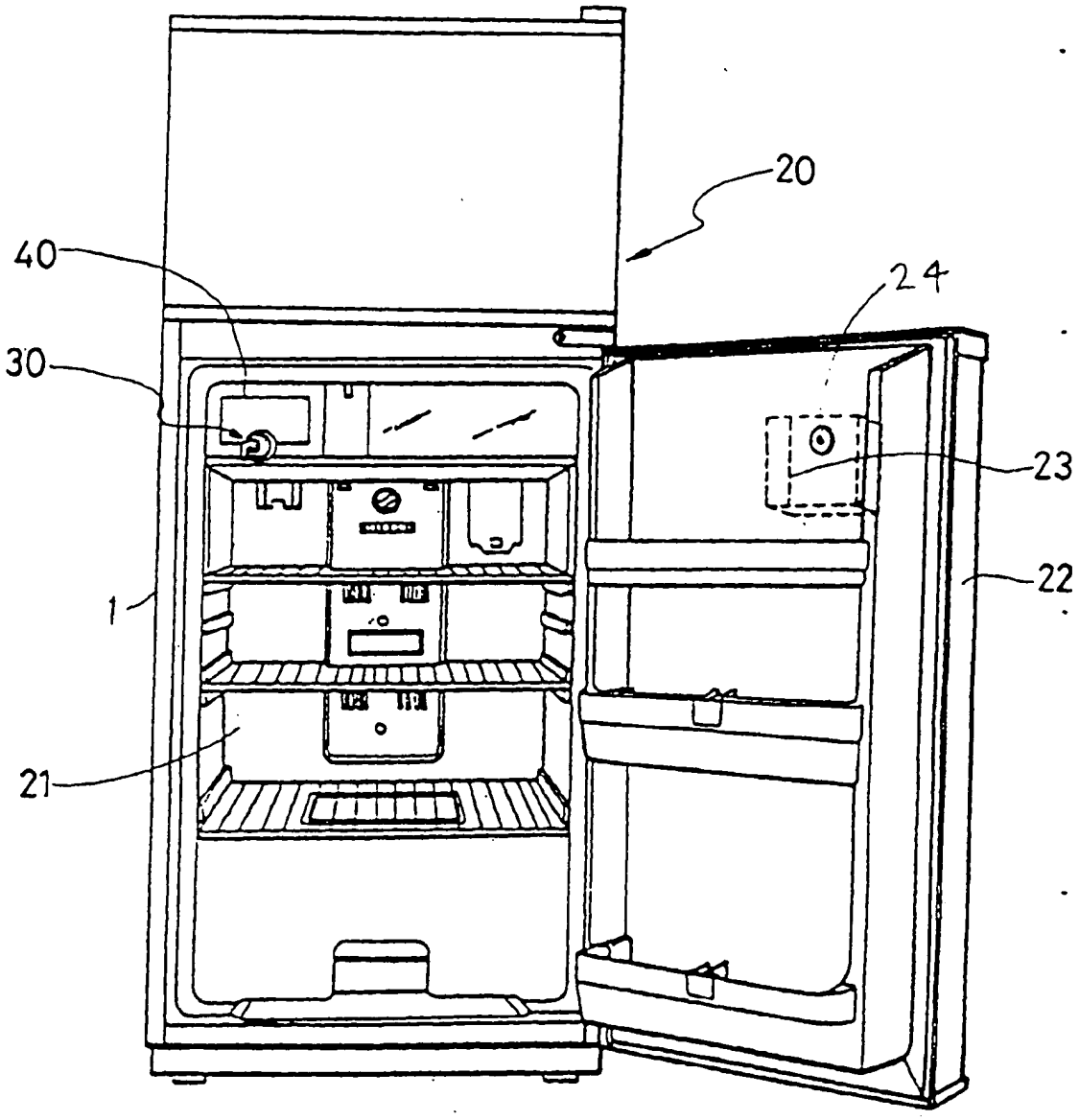
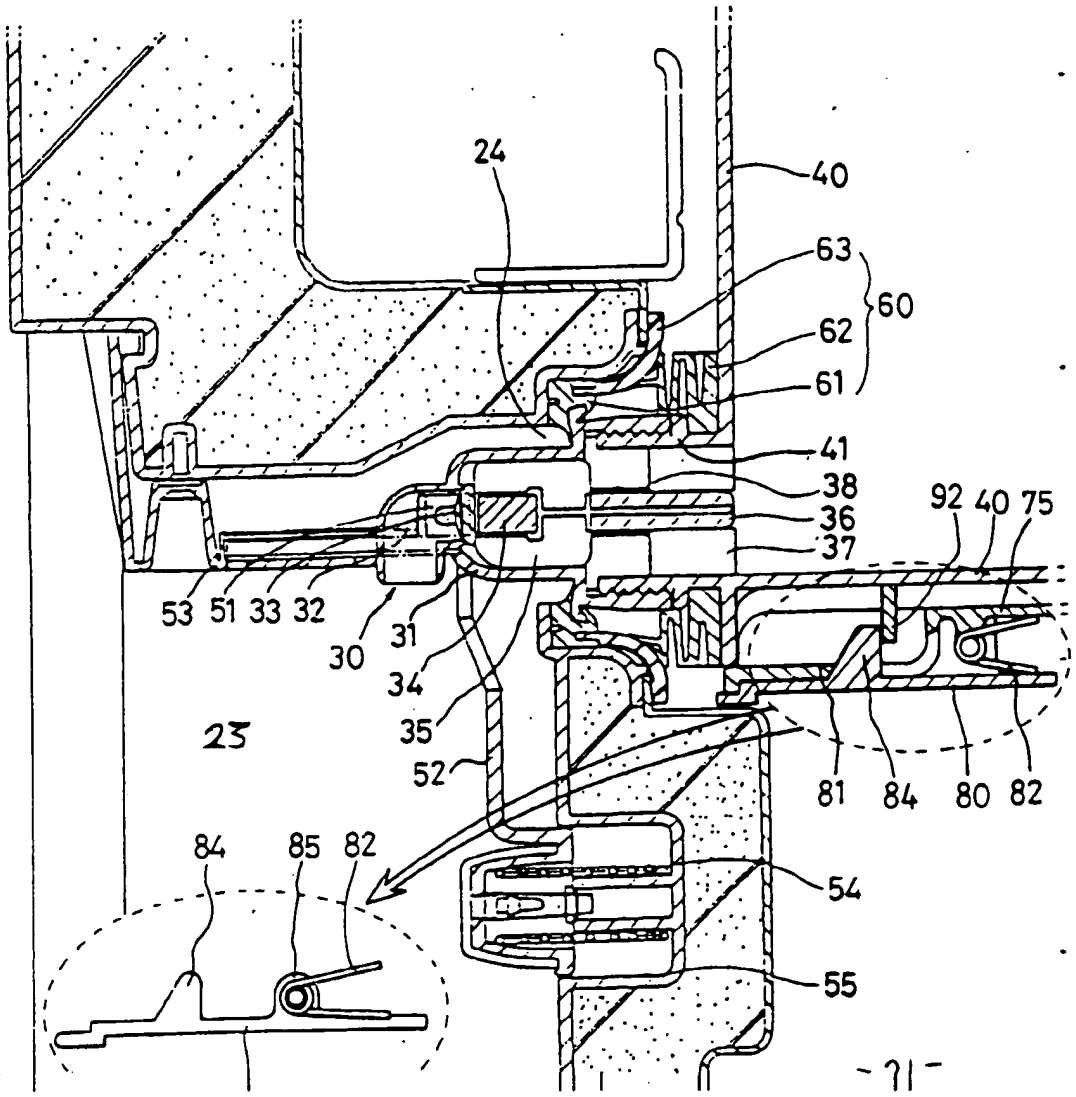


FIG.4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